

# RS-485 Port Protection Evaluation Board 1

## Introduction

This Evaluation Board serves as an aid in evaluating circuit protection on RS-485 serial device ports, using two Bourns® TBU® High-Speed Protectors (HSP), two fast-acting GDTs and two TVS diodes to meet the required industry standards on RS-485 port interfaces. The recommended Bourns® TBU® device solution, with a low capacitance GDT, offers enhanced high-speed performance features over competing technologies, which can help the design engineer increase the surge and transient protection level on RS-485 ports and place the entire circuit protection solution into a smaller reduced PCB area. Bourns has developed an RS-485 Evaluation Board (measuring 45 mm x 21 mm x 1.2 mm) manufactured using FR4 PCB with nickel gold plating on the top and bottom sides.

## How to Connect the Evaluation Board for Test Set-up

- Connect IN1 and IN2 to the exposed lines.
- Connect OUT1 and OUT2 to the RS-485 IC device.

\* The default configuration of this board uses 2 GDTs (GDT1, GDT2) and discrete SMB TVS diodes (TVS1, TVS2). The board allows different configurations:

- 2 single 2031 GDTs (GDT1 and GDT2) may be replaced by a dual 2030 GDT (GDT3)
- 2 SMB TVS diodes (TVS1 and TVS2) may be replaced with a) 2 SOT23 TVS diodes (TVS3, TVS4) or b) a single TVS diode array (TVS5)

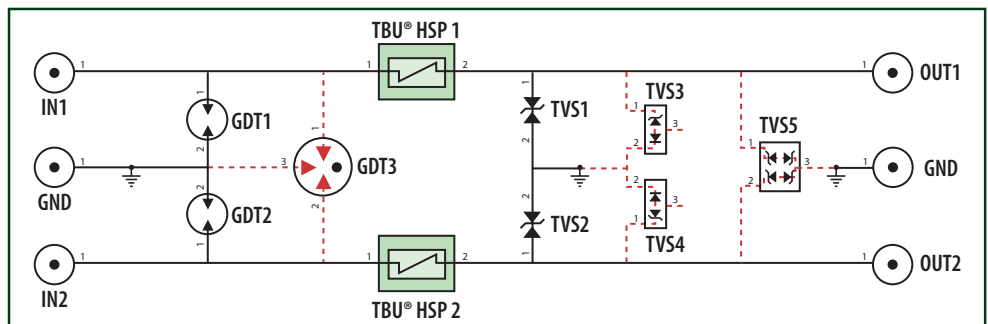


Figure 1 | RS-485 Evaluation Board Schematic

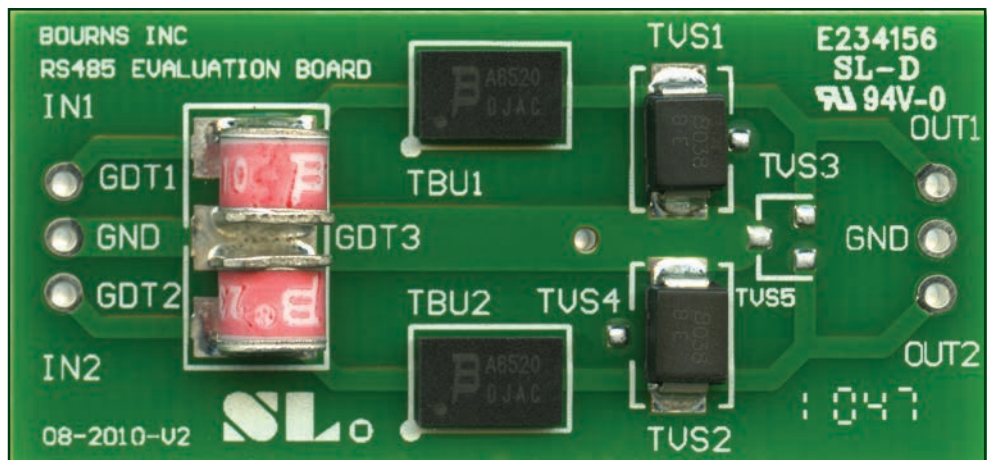


Figure 2 | RS-485 Evaluation Board Top Side Layout\*

Table 1 | RS-485 Evaluation Board Bill of Materials

No.	Part Number	Qty.	Description	Reference
1	TBU-CA065-200-WH	2	TBU® Single Bidirectional Line 650 V 200 mA	TBU® HSP 1, TBU® HSP 2
2	2031-23T-SM-RPLF	2	Single Line Fast-acting GDT 650 V	GDT1, GDT2
3	SMBJ12CA	2	Single Bidirectional Line TVS 12 V SMB	TVS1, TVS2

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## Performance Graphs

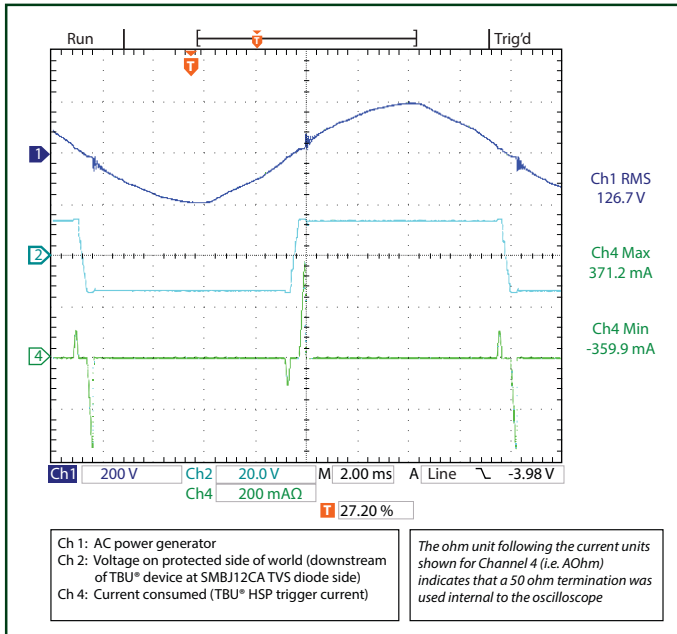


Figure 3 Power Cross 120 V<sub>rms</sub>

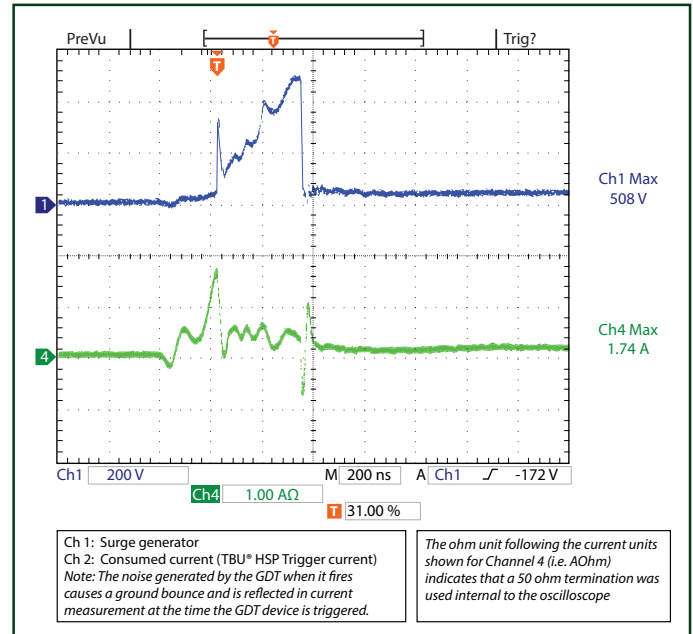


Figure 4 Slew Rate 1 KV/μs

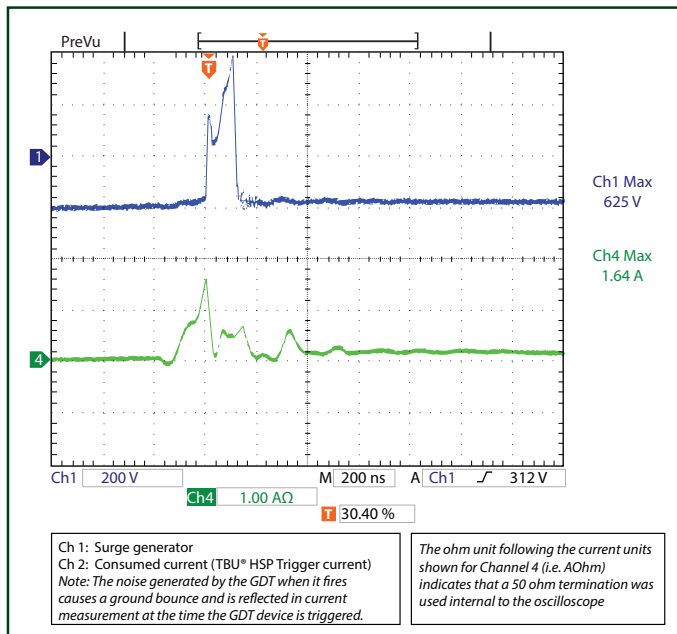


Figure 5 Slew Rate 5 KV/μs

### Reference

For more information on implementing advanced circuit protection technologies for RS-485 ports, please review the Bourns® RS-485 application note:

[http://www.bourns.com/data/global/pdfs/bourns\\_cpk1047\\_rs485\\_circuit\\_protection\\_appnote.pdf](http://www.bourns.com/data/global/pdfs/bourns_cpk1047_rs485_circuit_protection_appnote.pdf)

### Note

Please note that RS-485 Port Protection Evaluation Board 1 was replaced by [RS-485 Port Protection Evaluation Board 3](#) in order to extend the flat GDT configuration option.

For further technical support and for complete circuit protection solutions, please visit

[www.bourns.com](http://www.bourns.com)